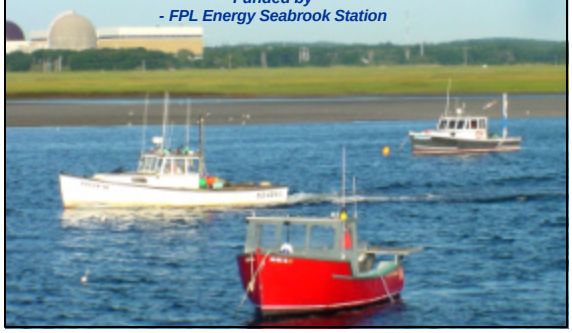
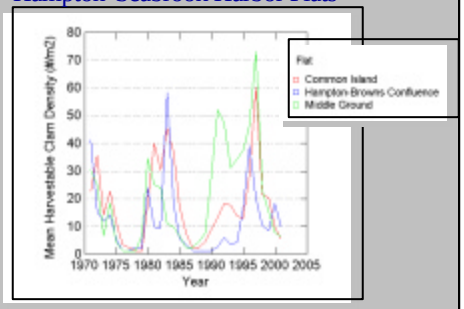
Softshell Clam Monitoring in Hampton Harbor

Paul Geoghegan - Normandeau Associates Inc.
Funded by
- FPL Energy Seabrook Station



Density of Harvestable Clams in Hampton-Seabrook Harbor Flats



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Lifestages of Softshell Clam

- Larvae
  - Offshore and Entrainment
- Benthic Stages
  - Young of the year (1-25 mm)
  - Yearlings (26-50 mm)
  - Adults (>50 mm)

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Monitoring Program

- Larvae
  - 3 stations weekly mid-April through October
  - Entrainment weekly mid April through October
- Benthic Stages
  - 4 flats surveyed in late-October or early November
- Monitoring vs. Experimental Approach

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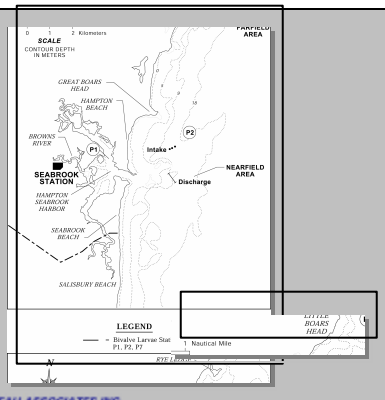

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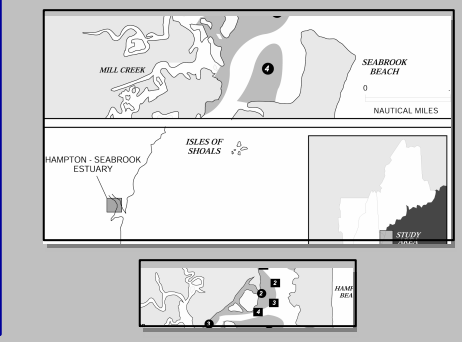

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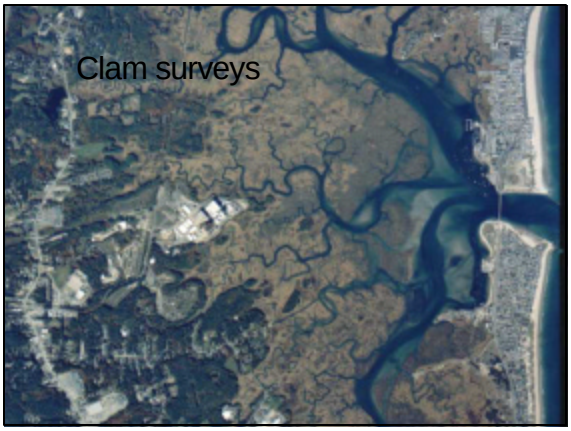

Softshell Clam Larvae

- Original concern was that plant would affect abundance of larvae
- Fewer larvae may mean lower recruitment
- However, no significant difference in larval densities before and after
- No significant differences nearfield and farfield

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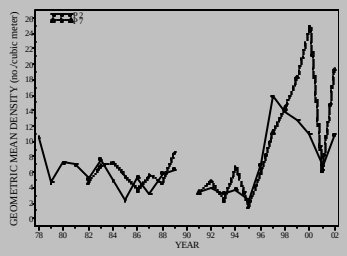
Annual Geometric Mean Density (no./m^3) of Larval Clams



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Young-of-the-year Density

- Variable, but no significant difference before and after plant startup
- Some evidence of three-year periodicity
- Supply of YOY has been relatively constant

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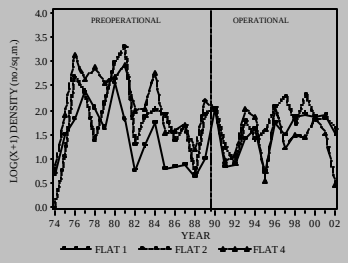
Annual Mean $\log_{10}(x+1)$ Density of Young-of-the-year Clams (1-25 mm)



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Yearling Density

- No significant difference before and after plant startup
- Three peaks in the time series
- Large decrease since 1996
- Currently at historically low levels
- Recruitment bottleneck for adults

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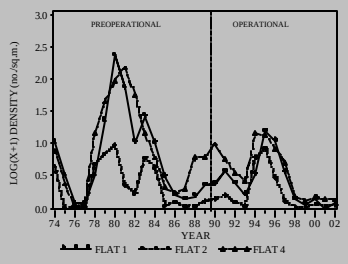
Annual Mean $\log_{10}(x+1)$ Density of Yearling Clams (26-50 mm)



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Adult Density

- Significantly more adults since plant startup
- Historical high densities in 1997
- Decreasing density in late 1990s and continuing

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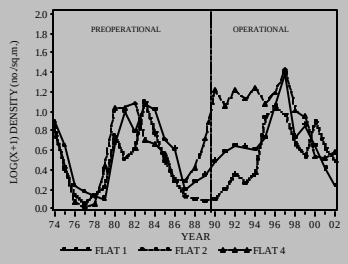
Annual Mean $\log_{10}(x+1)$ Density of Adult Clams (>50 mm)



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Summary of lifestage data

- Larvae and YOY - no sig diffs, relatively constant supply
- Yearlings - No sig diffs, Decreasing and at historical lows
- Adults – Significantly more after startup, but presently decreasing

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Causes?

- Larval supply
- Green crab predation
- Neoplasia
- Harvesting

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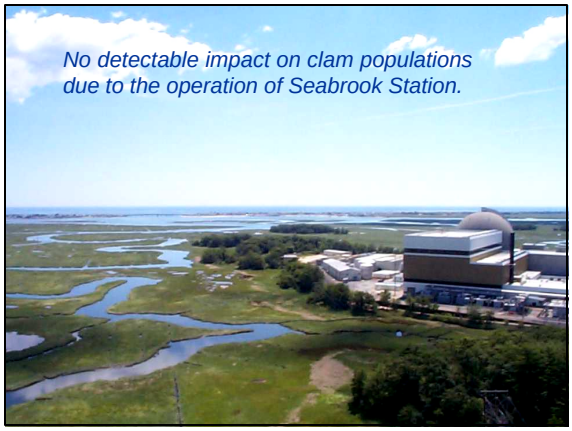
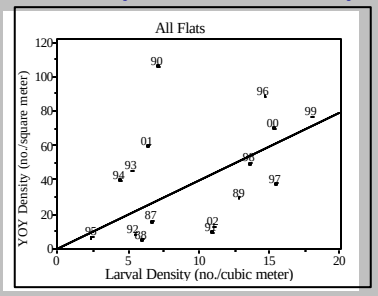


YOY Density versus Larval Density



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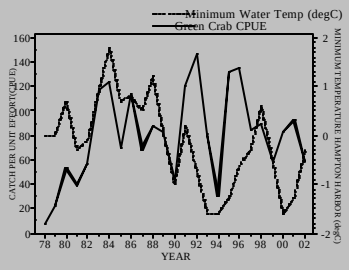
Mean Fall (October-December) Catch per Unit Effort of Green crabs and Minimum Water Temperature



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Experimental Investigation

- Brian Beal from UMaine Machias
- Experimental approach
- Looked at effects of:
  - Winter kill
  - Tidal height
  - Stocking density
  - Predator exclusion
  - Spatial variation

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Experimental Investigation

- Winter Kill - minimal
- Stocking density - not important
- Predator exclusion – losses are high
- "clam losses due to physical scouring of the sediments and predators was relatively high"

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